260542

FLOOD INSURANCE STUDY

CHARTER TOWNSHIP OF YPSILANTI, MICHIGAN

WASHTENAW COUNTY

DECEMBER 15, 1980

federal emergency management agency

federal insurance administration

COMMUNITY NUMBER - 260542

FEM 1.209:

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Flood Boundary and Floodway Map

PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index
Flood Insurance Rate Map

FLOOD INSURANCE STUDY

CHARTER TOWNSHIP OF YPSILANTI,
WASHTENAW COUNTY, MICHIGAN

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Charter Township of Ypsilanti, Washtenaw County, Michigan, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert the Charter Township of Ypsilanti to the regular program of flood insurance by the Federal Insurance Administration (FIA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these Federally-supported studies are based. These criteria take precedence over the minimum Federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 44 CFR, 60.1 (d). In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Army Corps of Engineers, Detroit District, for the Federal Insurance Administration, under Inter-Agency Agreement No. IAA-H-10-77, Project Order No. 15, Amendment No. 2. This study was completed in November 1979.

1.3 Coordination

Streams requiring either detailed or approximate study were identified at the initial coordination meeting held in September 1976 among representatives of the Charter Township of Ypsilanti, the FIA, and the U.S. Army Corps of Engineers (COE).

The technical aspects of the study were coordinated with the Bureau of Water Management Division of the Michigan Department of Natural Resources (DNR), the State Coordinating Agency. Other agencies contacted

in the course of the study included the Washtenaw County Planning Commission, the Washtenaw County Drain Commission, the Southeastern Michigan Council of Governments, and the U.S. Department of Agriculture, Soil Conservation Service (SCS), and the firm of Orchard, Papke, Hiltz and McCliment, Inc.

On July 29, 1980, the results of the work by the Study Contractor were reviewed and accepted at a final coordination meeting attended by representatives of the township, the DNR, the FIA, and the COE.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Charter Township of Ypsilanti, Washetenaw County, Michigan. The area of study is shown on the Vicinity Map (Figure 1).

The areas studied by detailed methods were selected with priority given to all known flood hazard areas, and areas of projected development or proposed construction through December 1983.

Approximate methods of analysis were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to and agreed upon by the FIA and the Charter Township of Ypsilanti.

The flooding sources studied by detailed methods are listed below:

a. the Huron River from the eastern corporate limit to the northern corporate limit, and from about 2,700 feet downstream of Leforge Road to Leforge Road, and from about 200 feet downstream of Conrail to about 500 feet upstream of Superior Road;

b. Paint Creek from the southern corporate limit to Interstate Highway 94 and from about 1,800 feet downstream of Michigan Avenue to about 900 feet upstream of Cobble Creek Road; and

c. West Branch Paint Creek from the southern corporate limit to about 500 feet upstream of Merritt Road.

Willow Run was studied by approximate methods.

2.2 Community Description

The Charter Township of Ypsilanti is located in the eastern half of Washtenaw County in southeastern Michigan, approximately 28 miles west of Detroit and just southeast of Ann Arbor. It borders the Township of Superior and the City of Ypsilanti to the north, the Township of Van Buren

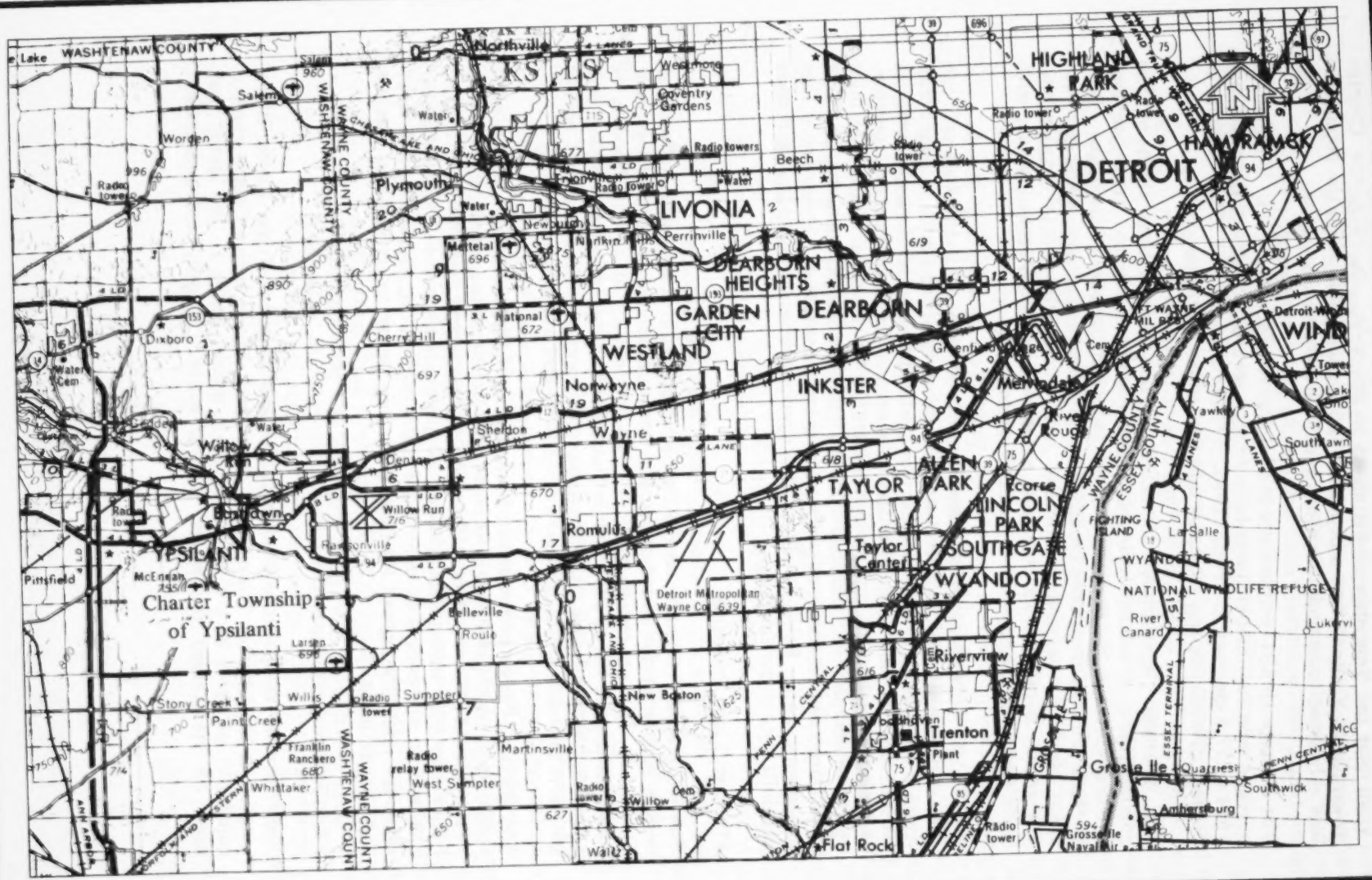

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CHARTER TOWNSHIP OF YPSILANTI, MI
(WASHTENAW CO.)

APPROXIMATE SCALE
4 0 4 8 12 MILES

VICINITY MAP

to the east, the Township of Augusta to the south, and the City of Ann Arbor and the Township of Pittsfield to the west. In 1970, the Charter Township of Ypsilanti had a population of 33,200 and in 1975, the population was estimated to be approximately 44,000 (Reference 1).

The average annual temperature is 48.3 degrees Fahrenheit (F). Extremes in average monthly temperatures have ranged from 11.4 degrees F. in January 1918 to 77.6 degrees F. in July 1955. Precipitation is 30.8 inches a year, 58 percent of which occurs from April to September (Reference 2).

The township topography is varied. The northwestern third of the community is a relatively level moraine that terminates at a previous existing glacial lake; the southeastern two-thirds is part of that lake. Both of these sections have been modified by the streams studied, which have cut flood plains of varying depths and widths into the glacial topography. Vegetation is of the type normally associated with residential areas, with some agricultural and wooded areas interspersed.

Residential development is concentrated on the northern half of the township, specifically, east and west of the City of Ypsilanti. Commercial development in this area has occurred along the arterial roads, such as Washtenaw Avenue and Michigan Avenue. In the southern portion, commercial, industrial, and residential development has been along the mile roads. Flood plains of the Huron River, Paint Creek, and West Branch Paint Creek are used primarily for agriculture and recreation. There are a few exceptions, as on Paint Creek, where apartments and single-family houses are built within the floodway.

2.3 Principal Flood Problems

The more severe flooding on the Huron River, Paint Creek, and Willow Run occurs in late winter and early spring from a combination of melting snow and heavy rain on frozen ground. The probability of severe flooding is increased on the Huron River by the constrictive bridges in the township and the debris which lodges itself on these structures. A similar effect occurs on Paint Creek, with its constrictive culverts and poor alignment.

The greatest floods of the Huron River during the past 60 years, as recorded by the U.S. Geological Survey (USGS) gage in Ann Arbor, occurred in March 1918, April 1947, and June 1968. These floods had respective estimated recurrence intervals of 38, 19, and 15 years, based on a flood frequency analysis for the period of records. Paint Creek during the June 1960 flood extended itself throughout its flood plain and flowed over Michigan Avenue and Textile Road.

2.4 Flood Protection Measures

There are no flood control projects for the reaches of the Huron River located in the Charter Township of Ypsilanti. The combined flood control capability of dams in the Huron River is minor, owing to the levels that must be maintained for water supply, waste disposal, and recreation.

Reservoir capacity is not available for large flood stage reduction (Reference 3). On Paint Creek, a retention pond has been built just south of Interstate Highway 94 to reduce the impact of flooding on the downstream properties located in the township. Between Interstate Highway 94 and Congress Street, the channel has been cleaned, widened, and straightened.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one percent chance of annual occurrence) in any 50-year period is about 40 percent (four in ten), and for any 90-year period, the risk increases to about 60 percent (six in ten). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail affecting the community.

To define the discharge-frequency data for the Huron River, the flows recorded for the past 60 years by the USGS Ann Arbor gage (no. 04174500) were used. Values for the 10-, 50-, 100-, and 500-year peak flows were obtained from a log-Pearson Type III distribution of annual peak flow data, as outlined by the U.S. Water Resources Council (Reference 4). For Paint Creek, the rainfall data was obtained from the Rainfall Frequency Atlas of the United States (Reference 5). Peak discharges of the 10-, 50-, 100-, and 500-year flows and the hydrographs were determined with techniques developed by the SCS which combine drainage characteristics such as drainage area, stream slope, soil cover, vegetation, and land use, in determining flows (Reference 6). The resulting hydrographs were combined and routed using the COE HEC-1 Flood Hydrograph Package (Reference 7). A division of flows for Paint Creek and West Branch Paint Creek was established by constructing an energy grade line-discharge relationship, which assumes that at their diversion, both energy grade lines are equal.

Because of the construction at Interstate Highway 94 and the retention pond downstream of Interstate Highway 94, there is a significant impoundment immediately downstream of these points. No exclusive drainage area for the West Branch Paint Creek was calculated, owing to the overflow condition which occurs there.

Peak discharges for the 10-, 50-, 100-, and 500-year floods of each flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
HURON RIVER					
Belleville Road	820	5,870	8,739	10,006	13,475
Interstate Highway 94	809	5,775	8,597	9,844	13,256
Peninsular Dam	802	5,643	8,401	9,619	12,954
PAINT CREEK					
Bemis Road	20.3	406	608	748	952
Upstream of West Branch	17.3	583	932	1,521	2,511
Stony Creek Road	14.8	706	1,292	1,888	2,950
Upstream of Chicking Ditch	5.8	149	279	506	885
At Interstate Highway 94	4.4	469	589	644	1,269
At West Michigan Avenue	4.1	585	1,075	1,407	2,662
At South Congress Street	3.1	535	980	1,215	2,250
WEST BRANCH PAINT CREEK					
Mouth	*	110	190	410	875

*No exclusive drainage area at diversion

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the streams in the community were carried out to provide estimates of the elevations of the floods of the selected recurrence intervals along each flooding source studied in detail.

Data for the cross sections were obtained by field survey.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 2).

Roughness coefficients (Manning's "n") for the Huron River were determined for the channel from the analysis at the high water marks for the June 1968 and April 1947 floods (Reference 3) and for the overbanks from field observation of the flood plains. Roughness coefficients for Paint Creek and West Branch Paint Creek were determined from field observation of the flood plains. The channel values ranged from 0.03 to 0.045; the overbank values ranged from 0.04 to 0.10. For Paint Creek, channel coefficients varied from 0.03 to 0.06; for the overbanks, they ranged from 0.03 to 0.10. For West Branch Paint Creek, channel values ranged from 0.027 to 0.045, and the overbank values were from 0.03 to 0.05.

Starting water-surface elevations were determined with the modified Puls routing technique for the Huron River, Paint Creek, and West Branch Paint Creek; they were determined with discharge-elevation curves for the Huron River (Reference 8). Water-surface profiles were developed through the use of the COE HEC-2 step-backwater program (Reference 9). Flood profiles were drawn to an accuracy of 0.5 foot for floods of the selected recurrence intervals (Exhibit 1). For Willow Run, which was studied by approximate methods, elevations were developed using normal depth calculations.

The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations as shown on the profiles are, therefore, considered valid only if hydraulic structures, in general, remain unobstructed and if channel and overbank conditions remain essentially the same as ascertained during this study.

All elevations are referenced from National Geodetic Vertical Datum of 1929 (NGVD); elevation reference marks used in the study are shown on the maps.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FIA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to

indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100-year and the 500-year floods have been delineated using the elevations determined at each cross section; between cross sections the boundaries were interpolated using topographic maps at a scale of 1:24000, with contour intervals of 5 and 10 feet (Reference 10), and topographic mapping at a scale of 1:1200 with a contour interval of two feet (Reference 11).

For Willow Run, which was studied by approximate methods, the boundary of the 100-year flood was developed using these same topographic maps.

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 2). Small areas within the flood boundaries may lie above the flood elevations and, therefore, not be subject to flooding; owing to lack of detailed topographical information or to limitations of the map scale, such areas are not shown. In cases where the 100-year and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of the FIA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. In Michigan, though, under Michigan Act 245, Public Acts of 1929, as amended by Act 167, Public Acts of 1968 (Reference 12), encroachment in the flood plain is limited to that which will cause only an insignificant increase in flood heights. Thus, at the recommendation of the Bureau of Water Management, a floodway having no more than a 0.1-foot surcharge has been delineated for this study.

In general, the technique used to define the floodways in this report was to describe the sweep and extent of moving floodwater by applying engineering judgment and basic rules of hydraulics to the flooded outline maps. The results of these computations were tabulated at selected cross sections for each stream segment for which a floodway was computed (Table 2). No floodway was determined for Ford Lake or the Paint Creek Retention Pond due to their significant impoundment capabilities.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE
HURON RIVER							
A	190,917	404	3889	2.6	654.6	654.5	0.1
B	191,687	348	2927	3.4	654.8	654.7	0.1
C	192,862	508	3619	2.8	655.5	655.4	0.1
D	193,702	416	3151	3.2	656.0	655.9	0.1
E	194,712	353	3077	3.3	656.6	656.5	0.1
F	196,592	295	3169	3.2	657.4	657.3	0.1
G	228,593	254/ 20[2]	2315	4.3	705.7	705.7	0.0
H	229,593	210/ 70[2]	1830	5.4	706.8	706.8	0.0
I	233,548	663	7340	1.3	719.1	719.1	0.0
J	235,010	589/210[2]	4884	2.0	719.8	719.8	0.0

[1]FEET ABOVE MOUTH
[2]TOTAL WIDTH / WIDTH WITHIN CORPORATE LIMITS

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CHARTER TOWNSHIP OF YPSILANTI, MI
(WASHTENAW CO.)

FLOODWAY DATA

HURON RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE
PAINT CREEK							
A	36,590	227	550	1.4	693.2	693.1	0.1
B	37,480	148	379	2.0	694.9	694.8	0.1
C	38,530	395	280	2.7	696.0	695.9	0.1
D	39,580	123	303	2.5	698.7	698.6	0.1
E	40,140	183	624	1.2	700.2	700.1	0.1
F	40,790	210	701	1.1	700.4	700.3	0.1
G	41,570	776	581	1.3	700.9	700.8	0.1
H	42,860	355	436	1.8	703.5	703.5	0.0
I	43,340	284	425	1.8	704.4	704.4	0.0
J	44,510	224	469	1.7	706.9	706.8	0.1
K	45,210	220	406	1.9	708.2	708.2	0.0
L	45,940	300	761	1.0	709.5	709.4	0.1
M	46,810	192	587	2.6	712.1	712.1	0.0
N	47,210	430	1305	1.2	712.6	712.6	0.0
O	48,130	181	459	3.3	713.7	713.6	0.1
P	49,760	248	883	1.7	716.9	716.8	0.1
Q	50,510	234	610	2.5	719.9	717.8	0.1
R	51,510	273	714	2.1	720.2	720.1	0.1
S	52,610	427	1317	1.2	723.3	723.2	0.1
T	54,770	608	1701	0.9	726.5	726.4	0.1
U	56,070	294	554	2.8	728.6	728.5	0.1
V	56,740	628	2136	0.9	730.5	730.4	0.1
W	57,740	425	904	2.1	730.8	730.7	0.1
X	59,060	339	1023	1.8	733.3	733.2	0.1
Y	60,220	218	393	1.3	735.2	735.1	0.1
Z	61,617	68	350	1.8	741.8	741.8	0.0

[1]FEET ABOVE MOUTH

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CHARTER TOWNSHIP OF YPSILANTI, MI
(WASHTENAW CO.)

FLOODWAY DATA

PAINT CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE
PAINT CREEK							
AA	61,887	19	164	3.9	741.8	741.8	0.0
AB	62,289	183	430	1.5	742.6	742.6	0.0
AC	62,789	205	300	2.1	743.0	743.0	0.0
AD	63,289	281	291	2.2	743.9	743.9	0.0
AE	63,889	240	384	1.7	746.0	746.0	0.0
AF	64,289	470	459	1.4	748.2	748.2	0.0
AG	66,995	922/827[2]	1703	0.6	755.1	755.1	0.0
AH	67,475	513/453[2]	759	1.7	755.2	755.2	0.0
AI	68,305	55	338	3.9	755.9	755.9	0.0
AJ	68,725	390	787	1.8	759.9	759.9	0.0
AK	69,261	209	523	2.8	760.1	760.1	0.0
AL	69,641	158	432	3.4	760.3	760.3	0.0
AM	69,858	114	432	3.4	760.5	760.5	0.0
AN	70,669	88	489	3.0	762.3	762.3	0.0
AO	70,894	31	145	8.4	762.4	762.4	0.0
WEST BRANCH PAINT CREEK							
A	15,046	236	347	1.2	700.7	700.6	0.1
B	16,046	195	335	1.2	701.1	701.0	0.1
C	17,046	141	223	1.8	702.1	702.0	0.1
D	18,146	197	142	2.9	703.9	703.8	0.1
E	19,146	69	134	3.1	706.5	706.4	0.1
F	20,146	144	192	2.1	707.7	707.6	0.1
G	21,166	55	106	3.9	710.9	710.8	0.1
H	21,366	205	436	0.9	711.9	711.9	0.0
I	21,786	113	245	1.7	712.0	712.0	0.0

[1]FEET ABOVE MOUTH
[2]TOTAL WIDTH / WIDTH WITHIN CORPORATE LIMITS

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CHARTER TOWNSHIP OF YPSILANTI, MI
(WASHTENAW CO.)

FLOODWAY DATA

PAINT CREEK - WEST BRANCH PAINT CREEK

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway boundaries were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 0.1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

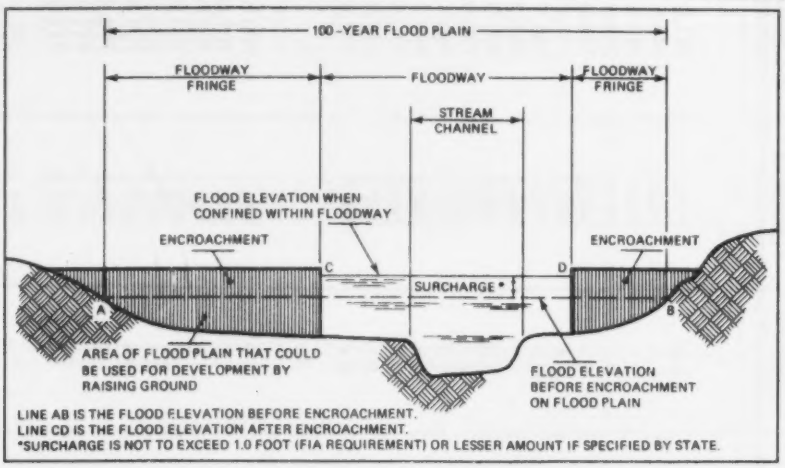
100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE *
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT.
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT.
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FIA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FIGURE 2 - Floodway Schematic

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FIA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHF), and flood insurance zone designations for each flooding source affecting the Charter Township of Ypsilanti.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the Charter Township of Ypsilanti are shown on the Flood Profiles (Exhibit 1) and are summarized in the Flood Insurance Zone Data Table (Table 3).

5.2 Flood Hazard Factors

The FHF is used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest 0.5 foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire incorporated area of the Charter Township of Ypsilanti was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations are shown or FHFs determined.
Zones A1-A4, A6, A7, A9:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations are shown, and zones subdivided according to FHF.

Zone B:	Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; or areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Charter Township of Ypsilanti is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FIA.

6.0 OTHER STUDIES

In 1976, the Detroit District COE completed a hydraulic analysis of the Huron River (Reference 3) for a reach extending from the downtown area of the City of Ypsilanti at Ford Lake through the upstream portion of the Township of Ann Arbor to Barton Pond, a distance of approximately 16.4 miles. This analysis was used for those two reaches of the Charter Township of Ypsilanti located between the City of Ypsilanti and the Township of Superior.

A Flood Insurance Study is published for the City of Ypsilanti (Reference 13). The results of that study match exactly those in this study.

A Flood Hazard Boundary Map has been published by the Federal Insurance Administration (Reference 14). The differences between the Flood Hazard Boundary Map and this study are justified due to the more detailed nature of this Flood Insurance Study.

This report either supersedes or is compatible with all previous studies published on streams studied in this report and should be considered authoritative for the purposes of the National Flood Insurance Program.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
HURON RIVER							
REACH 1	0010	–3.2	–0.8	2.0	030	A6	VARIES–SEE MAP
REACH 2	0010	–0.5	–0.0	2.6	005	A1	VARIES–SEE MAP
REACH 3	0005,0010	–3.0	–0.8	2.2	030	A6	VARIES–SEE MAP
REACH 4	0005	–1.7	–0.6	1.3	015	A3	VARIES–SEE MAP
PAINT CREEK							
REACH 1	0010	–0.8	–0.3	0.4	010	A2	VARIES–SEE MAP
REACH 2	0010	–1.4	–0.6	0.8	015	A3	VARIES–SEE MAP
REACH 3	0005,0010	–3.6	–0.8	1.4	035	A7	VARIES–SEE MAP
REACH 4	0005	–0.6	–0.1	0.6	005	A1	VARIES–SEE MAP
REACH 5	0005	–2.8	–1.4	4.3	030	A6	VARIES–SEE MAP
REACH 6	0005	–4.5	–0.5	0.9	045	A9	VARIES–SEE MAP
REACH 7	0005	–2.2	–0.3	1.2	020	A4	VARIES–SEE MAP
WEST BRANCH PAINT CREEK							
REACH 1	0010	–1.2	–0.7	0.7	010	A2	VARIES–SEE MAP
REACH 2	0010	–1.4	–0.6	0.8	015	A3	VARIES–SEE MAP

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CHARTER TOWNSHIP OF YPSILANTI, MI
(WASHTENAW CO.)

FLOOD INSURANCE ZONE DATA

HURON RIVER - PAINT CREEK - WEST BRANCH PAINT CREEK

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic and other pertinent data used in this study can be obtained by contacting the Insurance and Mitigation Division, Emergency Management Agency, One North Dearborn Street, Chicago, Illinois 60602.

8.0 REFERENCES AND BIBLIOGRAPHY

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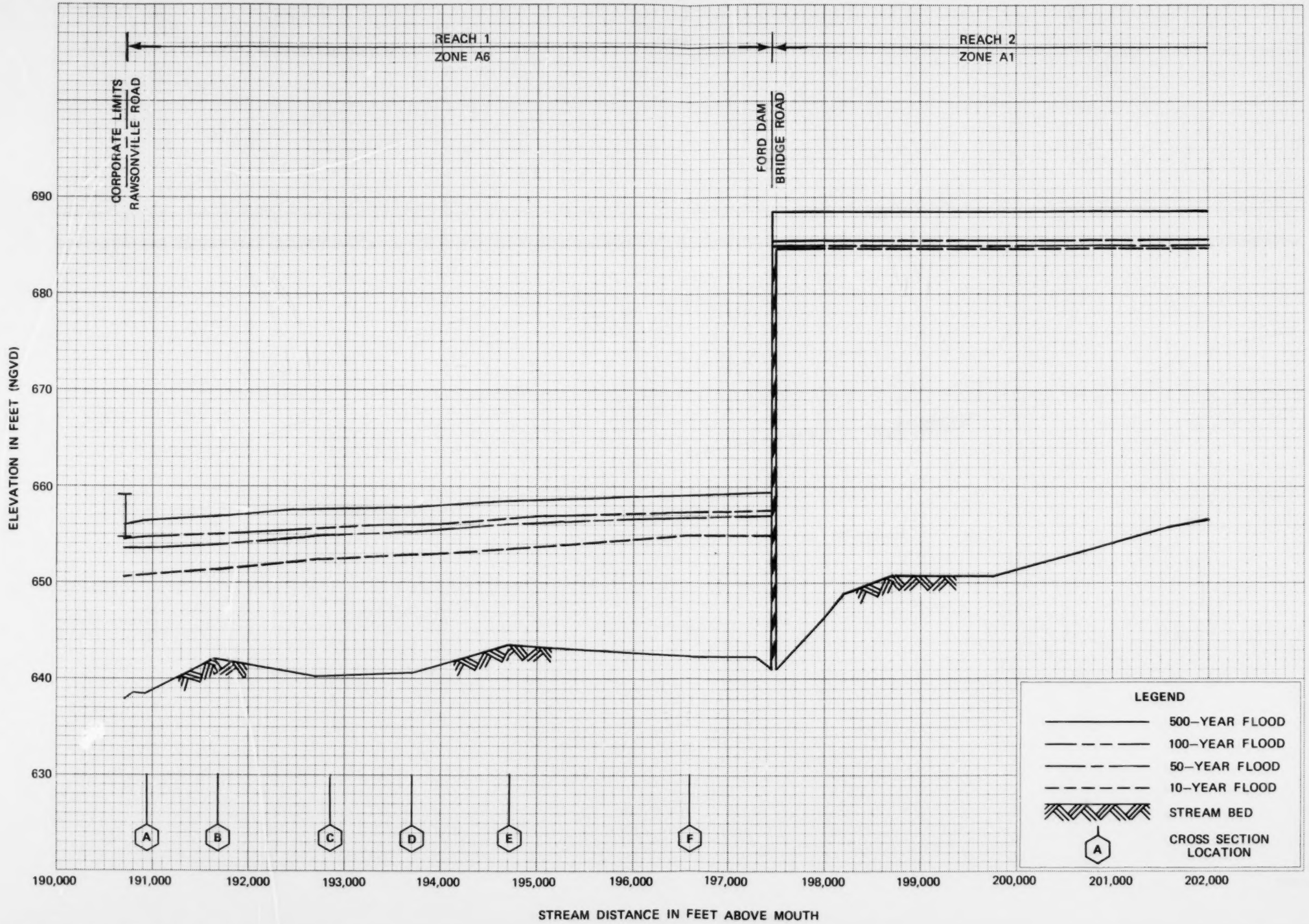

FLOOD PROFILES

HURON RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CHARTER TOWNSHIP OF YPSILANTI, MI
(WASHTENAW CO.)

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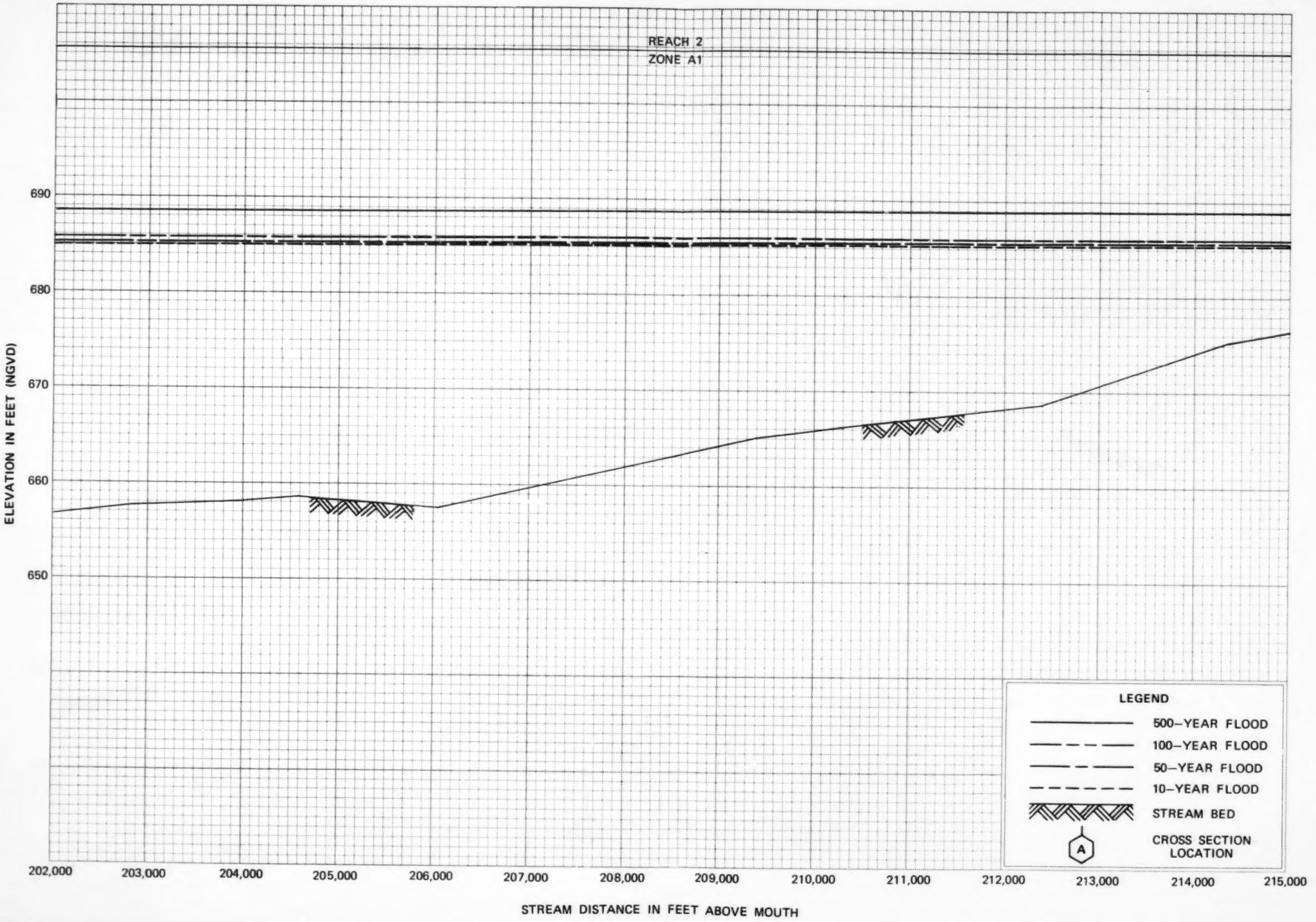


FLOOD PROFILES

HURON RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CHARTER TOWNSHIP OF YPSILANTI, MI
(WASHTENAW CO.)

02P

REACH 2
ZONE A1

REACH 3
ZONE A6

REACH 4
ZONE A3

CORPORATE LIMITS

CORPORATE LIMITS

LEFORGE ROAD
CORPORATE LIMITS

CORPORATE LIMITS

CONRAIL

SUPERIOR ROAD

CORPORATE LIMITS

ELEVATION IN FEET (NGVD)

730
720
710
700
690
680
670

215,000
216,000
217,000
227,000
228,000
229,000
230,000
232,000
233,000
234,000
235,000
236,000

STREAM DISTANCE IN FEET ABOVE MOUTH

G
H
I
J
A

LEGEND

500–YEAR FLOOD
100–YEAR FLOOD
50–YEAR FLOOD
10–YEAR FLOOD
STREAM BED
CROSS SECTION LOCATION

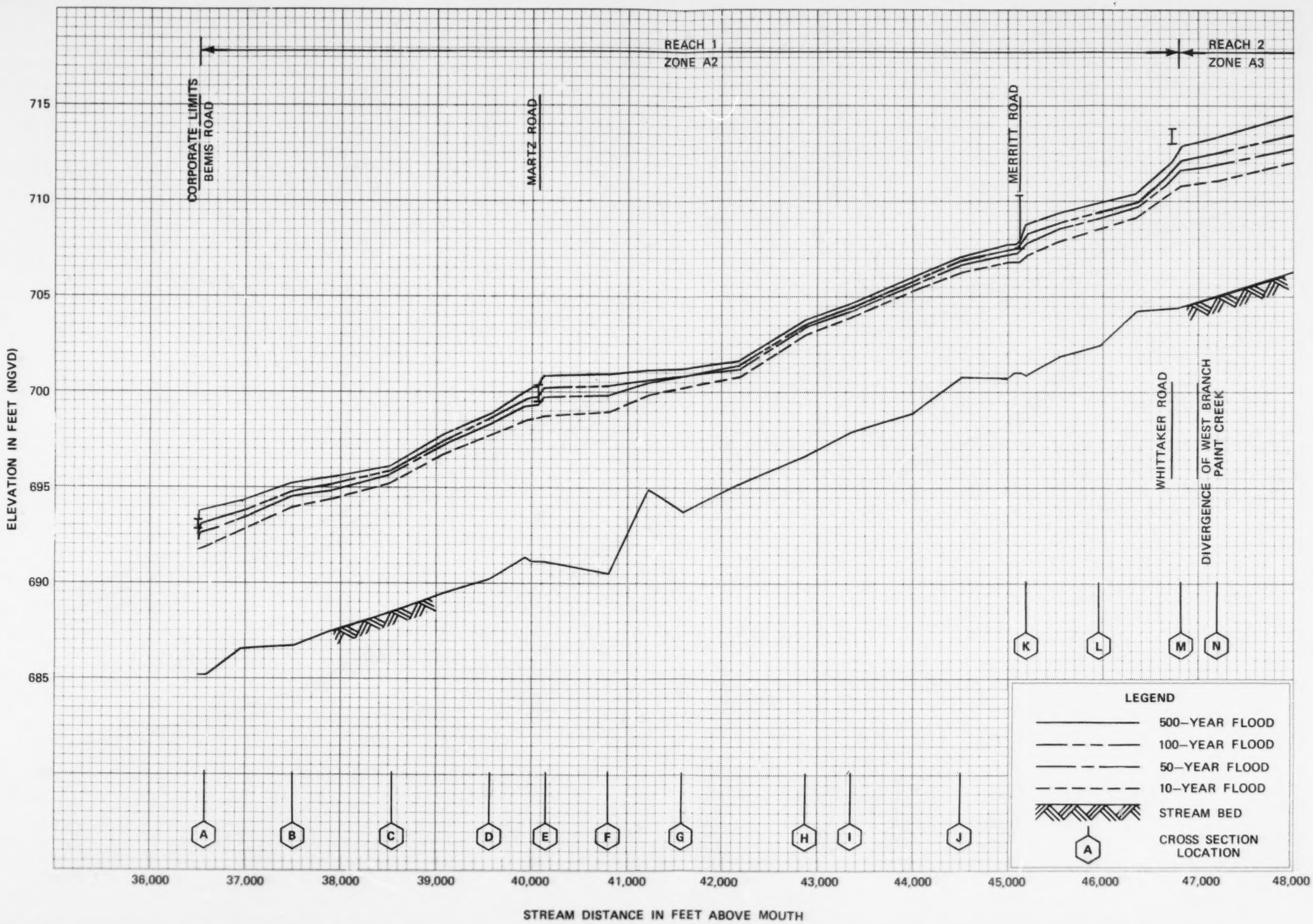
FLOOD PROFILES

HURON RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CHARTER TOWNSHIP OF YPSILANTI, MI
(WASHTENAW CO.)

03P



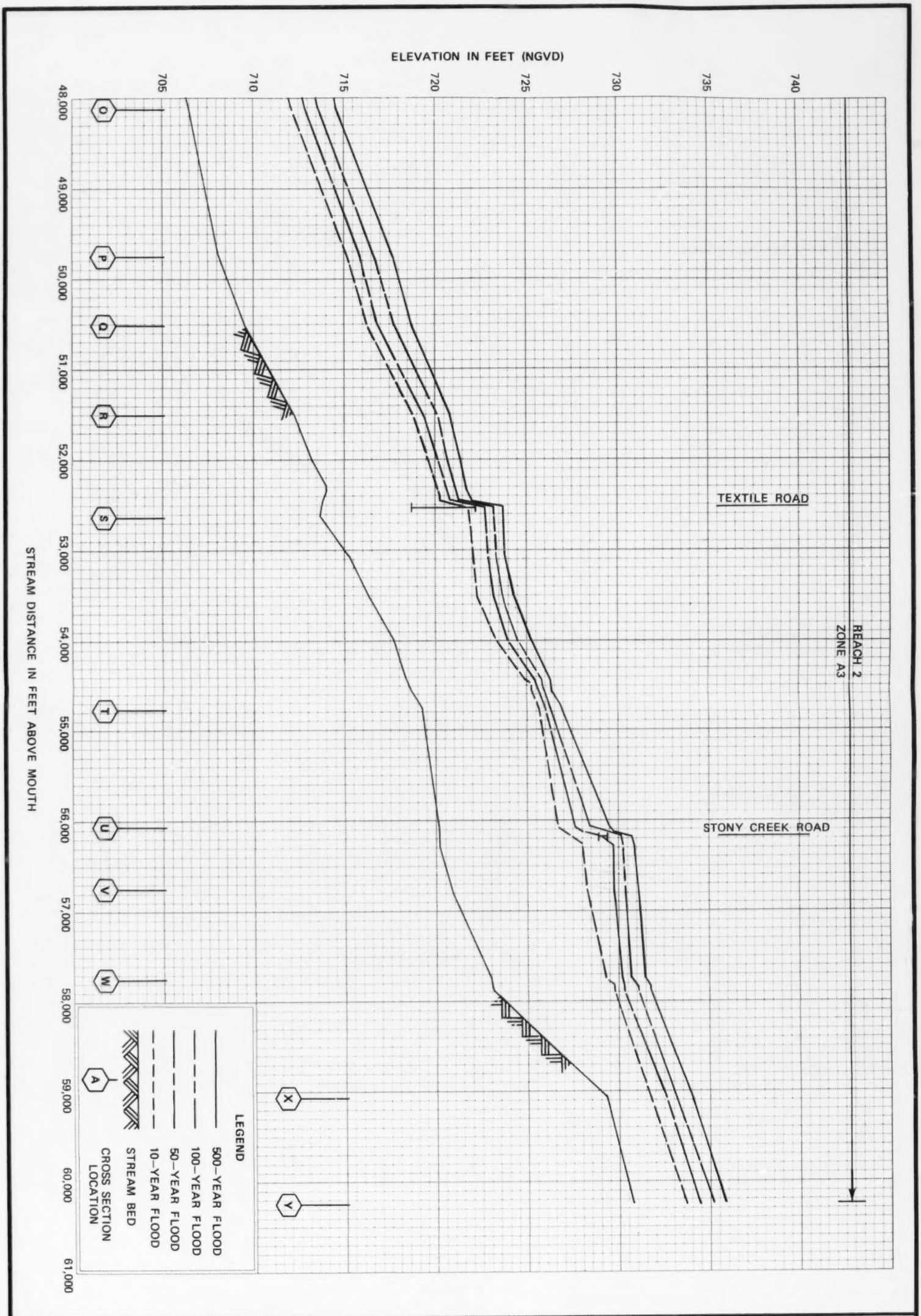
FLOOD PROFILES

PAINT CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CHARTER TOWNSHIP OF YPSILANTI, MI
(WASHTENAW CO.)

04P



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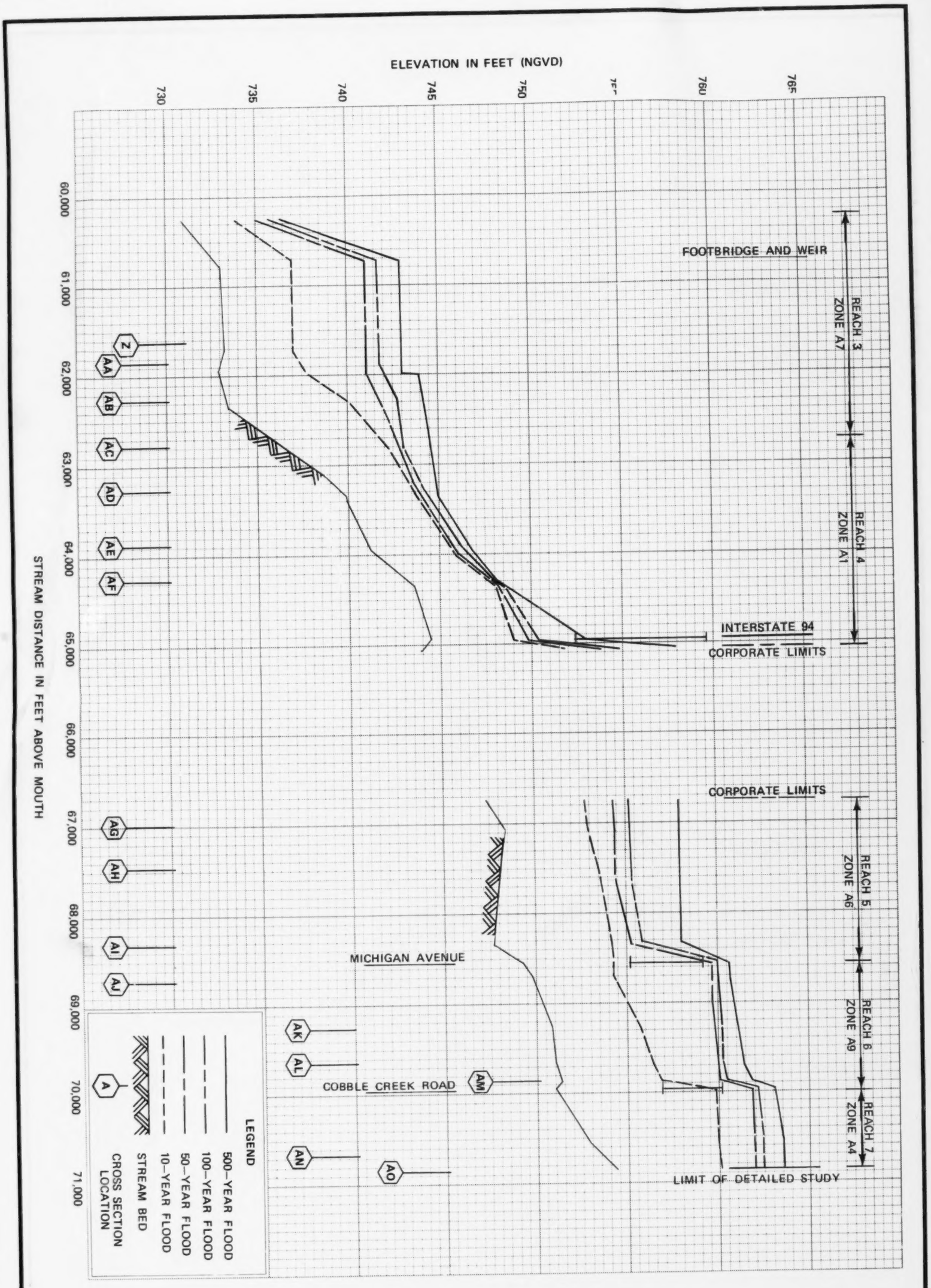
FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CHARTER TOWNSHIP OF YPSILANTI, MI
(WASHTENAW CO.)

FLOOD PROFILES

PAINT CREEK



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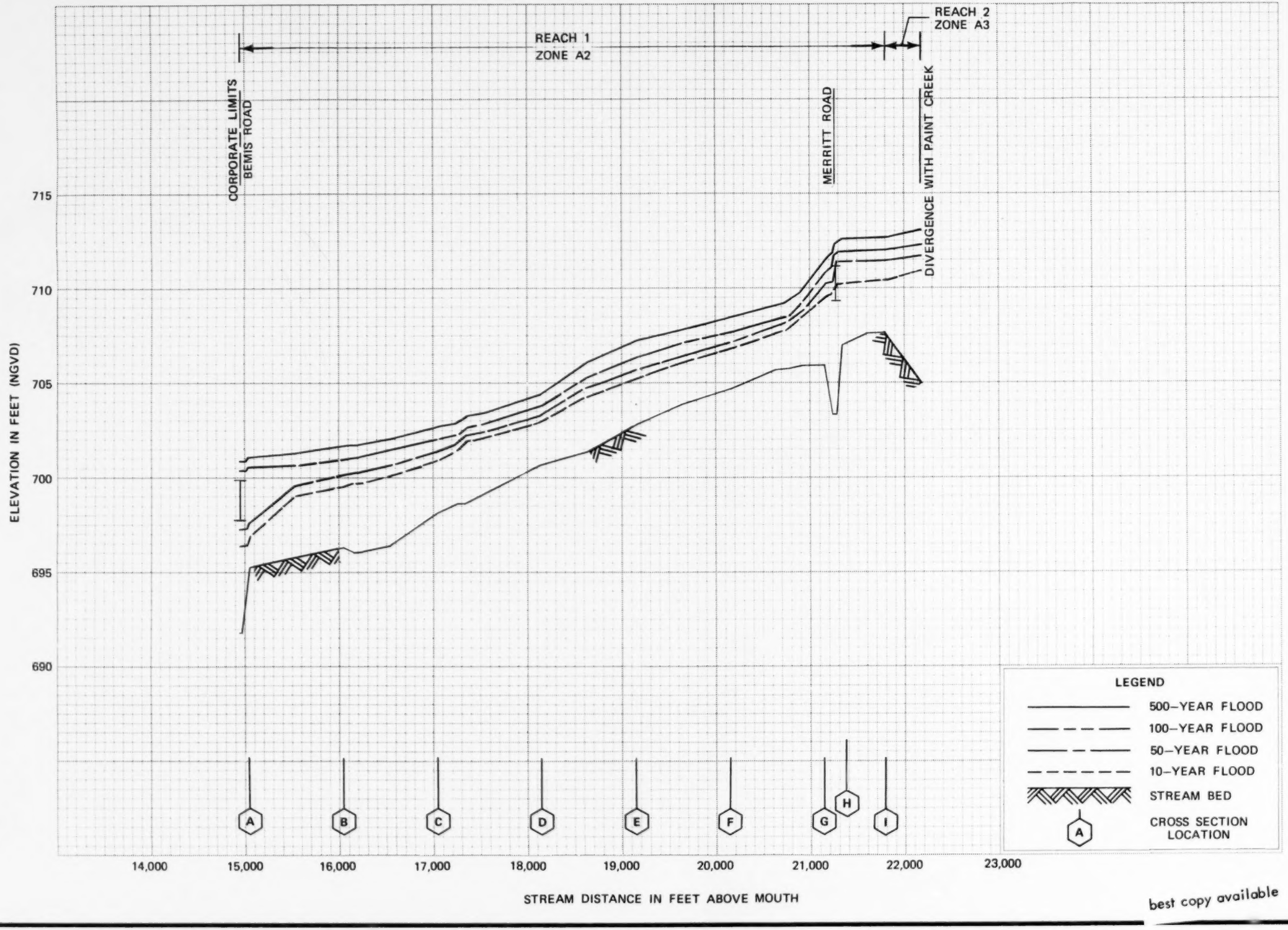
FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CHARTER TOWNSHIP OF YPSILANTI, MI
(WASHTENAW CO.)

FLOOD PROFILES

PAINT CREEK



FLOOD PROFILES

WEST BRANCH PAINT CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CHARTER TOWNSHIP OF YPSILANTI MI
(WASHTENAW CO.)

07P

best copy available